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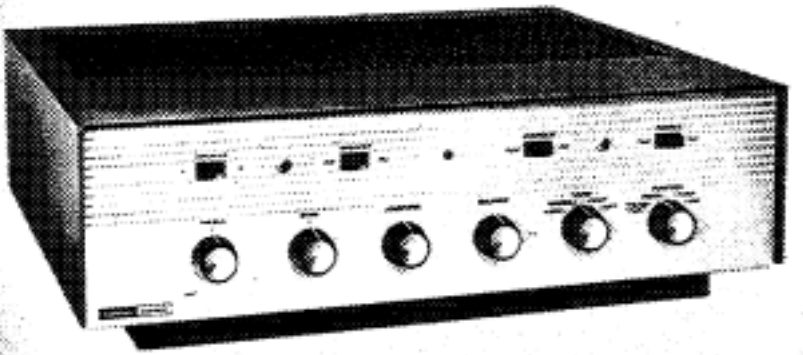
harman kardon



The Trio

MODEL A224

TRIPLEX STEREOPHONIC AMPLIFIER

INSTRUCTION MANUAL

It is essential you read this instruction booklet carefully before installing your high fidelity system. You have invested in an extremely fine electronic instrument into which many excellent engineering developments have been incorporated, and each is important for the proper operation of your system. This booklet has been written in simple non-technical language and if you will take time to read it first before doing anything else, you will find it simple to obtain optimum performance from your Harman-Kardon Model A-224 Stereophonic Amplifier.

Be sure to keep this booklet available at all times. It contains indispensable technical and service information.

This is the Harman-Kardon Stereo Symbol. It is your assurance of superb stereo performance.

GENERAL DESCRIPTION

The A-224 stereophonic amplifier is extremely versatile and may be used in any of the following ways.

1—Stereophonic amplifier with 12 watts of audio in each channel.
2—Monaural amplifier with 24 watts of audio, 48 watt peaks.
3—Stereophonic conversion amplifier utilizing your present high fidelity amplifier or combination unit for the second channel.

UNPACKING

After unpacking the Trio, inspect it carefully for signs of transit damage. The unit was subjected to many inspections and tests prior to final packing, and it therefore should be in perfect condition. If damage is visible, notify your dealer at once. If the unit was shipped to you, notify the transportation company without delay.

Check the contents of the carton thoroughly and inspect the folds of the packing material before discarding it. Your package should contain the following items:

1 Trio, Model A-224 Stereophonic Amplifier-Preamplifier.
1 Instruction Booklet
1 Warranty Card
1 Mounting Template.

WARRANTY POLICY

We urge you to completely fill in your warranty card and mail it to the factory without delay to protect your rights under warranty. The warranty cards are carefully filed for reference and should you require information on the use of this high fidelity unit, or repair service, we will be able to immediately identify your set and reply quickly.

NOTE: It is necessary to receive factory authorization before returning a set for warranty repair either to the factory or to an authorized station. Repairs are to be returned on an Express Prepaid basis. A letter describing the exact difficulty must be enclosed with the unit.

WARRANTY

We warrant each Trio Model A-224 to be free from defects in material and workmanship under normal use and service, and in accordance with the conditions herein below set forth, for a period of 1 year from date of delivery to the original purchaser, and agree to replace or repair any part or parts, with the exception of tubes which are under the manufacturer's 90 day warranty, returned to us within said 1 year, with transportation prepaid and which our examination shall disclose to our satisfaction to have been thus defective. This warranty does not include free labor, nor is it applicable to any instrument which shall have been repaired or altered in any way so as in our judgment to affect its stability or reliability nor which has been subject to neglect, misuse, abuse, negligence or accident nor which has had the serial number altered, effaced, or removed. Neither shall this warranty apply to any instrument which has been connected otherwise than in accordance with instructions furnished by us.

This warranty is expressly in lieu of all other warranties, express or implied, and of all other obligations or liability on our part, and we neither assume nor authorize any representative or other person to assume for us any other liability in connection with the sale of this instrument.

USING THE MODEL A-224 AS A STEREOPHONIC AMPLIFIER

INSTALLATION PROCEDURE

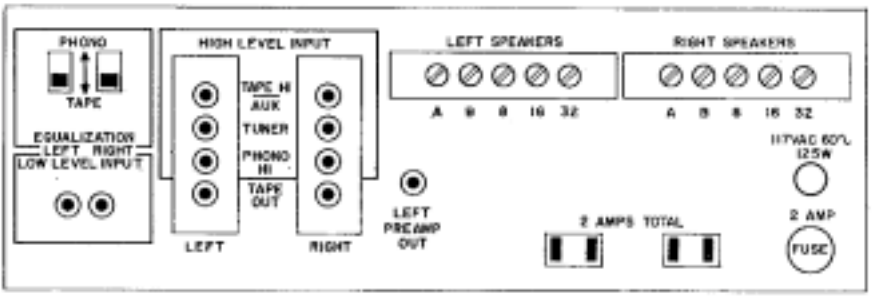
Ventilation:

The unit is well ventilated in itself, but sufficient space must be allowed around it to permit proper air flow. Install the amplifier in a manner to allow for unrestricted circulation. Do not place books or other objects on the cage or in the immediate vicinity of the instrument. Reducing the air flow will result in sharply reduced component and tube life.

Power Requirements:

Plug the AC cord into any outlet furnishing 117 volts 50 or 60 cycle AC current. The voltage may vary between 105 and 125 volts. Two AC convenience outlets are located on the rear of the instrument. Auxiliary equipment (tape deck, record player, additional amplifier) may be plugged into these outlets and will be controlled by the on/off switch located on the A-224.

REAR PANEL CONNECTIONS



REAR PANEL MODEL A224

Connecting Your Speakers:

Your two speakers should be matched if possible to obtain optimum results and should be placed approximately 8 to 15 feet apart against one wall of your listening room. Corner placement is also quite acceptable. Facing the speakers straight out or slanting them slightly will depend on your room size, acoustic effect and where you will be seated for listening. It may be necessary to experiment with speaker placement until best results are obtained.

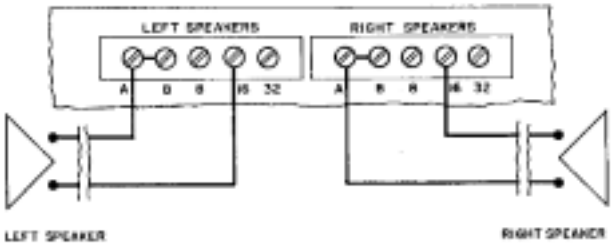
Use any type wire to connect your speakers. Lamp cord is excellent and may be easily dressed around the molding for an inconspicuous and neat installation.

Normal Stereo Speaker Arrangement:

Connect one lead from the left speaker to the 16 ohm terminal on the LEFT SPEAKER output strip and the other lead to the A or B terminal on the same strip. Now connect one of the leads from the right speaker to the 16 ohm terminal on the RIGHT SPEAKER output strip and the other lead to the A or B terminal on the same strip. NOTE: A and B terminals on both SPEAKER output strips are strapped together at the factory and should be allowed to remain strapped for this method of stereo speaker connection. (See Diagram A) The output terminals used should be those marked with the same impedance as the speakers. The above illustration is for 16 ohm speakers. If you are using 8 ohm speakers connect to the 8 ohm SPEAKER output terminals rather than to the 16 ohm terminals.

The two SPEAKER SELECTOR switches located on the front panel are inoperative for this method of connection, and their setting is therefore not critical.

IMPORTANT: For all methods of stereo operation, the POWER PARALLEL switch mounted on the front chassis support apron to the left of the pilot light must remain in the "SEPARATE" position. The cage (if used) must be removed to provide access to this switch.



NORMAL STEREO SPEAKER HOOK UP

Diagram A

Two Independent Stereo Speaker Systems:

The Model A-224 stereo amplifier incorporates a unique switching arrangement enabling the user to operate two independent stereo speaker systems located in different rooms.

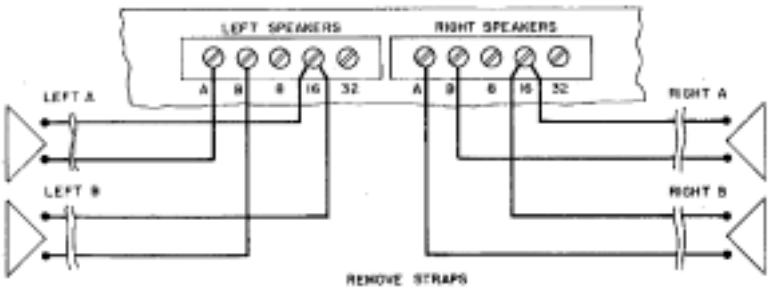
Remove the shorting bar between A and B terminals on both SPEAKER output strips. Connect a lead from the left speaker in System A to the 16 ohm terminal on the LEFT SPEAKER output strip and another lead from this speaker to the A terminal on the same strip. Connect the right speaker in System A to terminals 16 and A on the RIGHT SPEAKER output strip. This complete System A installation.

To install System B connect a lead from the left speaker to the 16 ohm terminal on the LEFT SPEAKER output strip and another lead to the B terminal on the same strip. Now connect the right speaker in System B to the 16 and B terminals on the RIGHT SPEAKER output strip. This completes System B installation. (See Diagram B)

The above illustration is for 16 ohm speakers. If you are using 8 ohm speakers connect to the 8 ohm terminals on the SPEAKER OUTPUT strip rather than to the 16. If one pair of speakers is 8 ohms and the other pair 16 ohms, then connect appropriately.

For this type of installation the SPEAKER SELECTOR switches located on the front panel are operative. See Stereo Operating Instructions.

IMPORTANT: The POWER PARALLEL switch located on the front chassis support apron to the left of the pilot light must remain in the "SEPARATE" position. The cage (if used) must be removed to provide access to this switch.



HOOK UP OF TWO INDEPENDENT STEREO SPEAKER SYSTEMS

Diagram B

No further connections need be made to your old monaural amplifier. Program sources such as tuner, tape, phonograph, etc., are connected to the appropriate receptacles on the A-224 as described under stereo installation.

OPERATING YOUR MODEL A-224 AS A CONVERSION AMPLIFIER

Operation of the model A-224 as a stereo conversion amplifier is identical with its operation as a normal stereo amplifier. The controls of the old monaural amplifier, now being used as one channel of your new stereo system, must be properly set, however, and then left permanently in that setting. Set the tone controls and contour switch to flat, the rumble and scratch filter switches to off, and the function selector to AUX or TUNER, depending on which input receptacle was used for connecting to the A-224.

Set the VOLUME control on your old amplifier to minimum and adjust the BALANCE Control on your Model A-224 to the mid-point. Play a stereo record or tape and turn the LOUDNESS Control on your A-224 up to a normal listening volume. The left channel will be inoperative since the volume control on your old amplifier is set at minimum. Now slowly rotate the volume control on this amplifier until the loudness of the two channels is equal. Allow the volume control on your second amplifier to remain in this position permanently.

ADJUSTMENTS

Output Balance:

Individual OUTPUT BALANCE controls for Left and Right channels are located between the EL-84 output tubes. These controls balance the two output tubes of each channel for lowest power hum and distortion. Adjustment is quite simple: With the amplifier turned on for a sufficient length of time to be thoroughly warmed up, turn the LOUDNESS control to minimum. Now, while listening carefully to the left speaker, adjust the LEFT OUTPUT BALANCE control for minimum hum. Then, while listening to the right speaker only, adjust the RIGHT OUTPUT BALANCE control for minimum hum. Due to the extremely low hum level of the A-224, this is best done at a time when the room is very quiet. The setting for minimum hum is attained only when the two power tubes have been exactly balanced, and this is the condition for absolute minimum distortion.

Hum Adjustment:

One HUM ADJUST-HIGH LEVEL control and one HUM ADJUST-LOW LEVEL control are located on the chassis behind the electolytic condenser and in front of the 12AU7 tube. Each operates simultaneously to adjust both left and right channels. To adjust for minimum hum, set the FUNCTION switch to TUNER, turn the tuner off (if connected) and turn the LOUDNESS control full on. While listening to either speaker, adjust the HIGH LEVEL hum control for minimum hum. Now set the FUNCTION switch to the TAPE-LO position, and set the LOW LEVEL hum control for minimum hum.

System Hum or Noise:

In any high fidelity installation, hum may be caused by the interconnection of a record changer, tuner and amplifier, as a result of the cables and different grounds. A good way to eliminate this problem is to first disconnect everything but the speakers from the amplifier, and listen for hum. If the hum persists, make the hum and balance adjustments described above. Try reversing the amplifier power plug. Now plug in the record player. If hum appears, try reversing the record player power plug, and try connecting a wire from the record player chassis to the amplifier chassis. In this way, connect the tuner, tape deck and other devices in turn.

Note that hum may be picked up by defective interconnecting cables, and by interconnecting cables running too close to power cables.

Connecting Your Tuner:

The FM output of your Harman-Kardon stereo tuner should be connected to the LEFT TUNER input jack on the HIGH LEVEL INPUT strip located on the rear panel. The AM output should be connected to the RIGHT HIGH LEVEL INPUT jack. The same method of installation applies if you are using separate FM and AM tuners. Plug the AC line cord of your tuner into one of the AC convenience outlets located on the rear panel of the Model A-224 amplifier.

Connecting Your Stereo Record Player:

A stereo cartridge is essentially two cartridges in one and uses two ouput connecting plugs. If you are using a low level magnetic cartridge plug one output lead into the LEFT LOW LEVEL INPUT located on the lower left rear of the chassis, and the other plug into the RIGHT LOW LEVEL INPUT jack. Both PHONO/TAPE switches located directly above the LOW LEVEL INPUT jacks must be placed in the up or "PHONO" position.

Stereo crystal or ceramic cartridges may also be used with this amplifier. They must be plugged into the LEFT and RIGHT PHONO-HI jacks located on the HIGH LEVEL INPUT strip on the rear panel. Plug the AC line cord of your record player into one of the AC convenience outlets located on the rear panel of the Model A-224 amplifier.

Connecting Your Stereo Tape Player:

A stereophonic tape deck utilizes two playback heads. Each head has its own output plug. Connect one plug to the LEFT LOW LEVEL INPUT jack located on the lower rear of the chassis, and the other output plug to the RIGHT LOW LEVEL INPUT jack. Place both PHONO/TAPE switches located directly above the LOW LEVEL INPUT jacks down, in the "TAPE" position.

Since the Model A-224 has only one pair of low level input receptacles for stereo use, either a magnetic cartridge or a tape head may be plugged in. If both types of program sources are desired, it is suggested a ceramic cartridge be used instead of a magnetic type. The tape head can then be plugged into the two LOW LEVEL INPUT jacks and the ceramic cartridge can be plugged into the two PHONO-HI jacks.

Connecting Your Stereo Tape Recorder:

Since most stereo tape recorders have their own preamplifiers, it is not desirable to plug the output of the recorder into the LOW LEVEL INPUT. This might cause overloading of the input stage. Connect one of the output plugs into the TAPE-HI/AUX jack on the RIGHT HIGH LEVEL INPUT strip and the other into the TAPE-HI/AUX jack on the LEFT HIGH LEVEL INPUT strip.

Connecting Your Tape Recorder To Make A Recording:

Provision is made on your Model A-224 to permit the recording of any program material. Connect the left input of your stereo tape recorder to the receptacle marked LEFT TAPE OUT on the rear panel and the right input of your stereo tape recorder to the receptacle marked RIGHT TAPE OUT. To connect a monaural tape recorder, connect its input to either LEFT or RIGHT TAPE OUT receptacle. If the program source you desire to record is plugged into the left preamplifier channel, use the LEFT TAPE OUT jack, and if it is plugged into the right preamplifier channel, use the RIGHT TAPE OUT jack. This will enable you to make a recording with the proper recording equalization as determined by your recorder, while simultaneously monitoring the program with the proper tone control, contour and loudness setting.

Connecting Your Record Player:

Any type of record player may be used with this amplifier. If your player uses a low level magnetic cartridge plug it into either the LEFT or RIGHT LOW LEVEL INPUT. Set the appropriate PHONO/TAPE switch located on the rear panel to the "PHONO" position. If you are using a monaural ceramic or crystal cartridge plug it into either the LEFT or RIGHT PHONO-HI input.

Connecting Your Tape Player:

Connect your monaural tape deck to one of the LOW LEVEL INPUT jacks on the rear panel. If your magnetic cartridge is connected to the LEFT LOW LEVEL INPUT, connect the tape deck to the RIGHT LOW LEVEL INPUT, or vice-versa. The PHONO/TAPE EQUALIZATION switch corresponding to the LOW LEVEL INPUT used for the tape deck must be in the TAPE position for proper tone equalization.

Connecting Your Tape Recorder:

Since most monaural tape recorders have their own preamplifier, it is not desirable to plug the output of the recorder into the LOW LEVEL INPUT jack. This might cause overloading of the input stage. Connect the recorder output plug to either LEFT or RIGHT TAPE-HI/AUX jack on the rear panel.

Connecting Your Tape Recorder To Make A Recording:

Provision is made on your Model A-224 amplifier to permit the recording of any program material. Connect the input of your monaural tape recorder to either the LEFT or RIGHT TAPE OUT receptacle located on the rear panel. If the program source you desire to record is plugged into the left preamplifier channel, use the LEFT TAPE OUT jack and if it is plugged into the right preamplifier channel, use the RIGHT TAPE OUT jack. This will enable you to make a recording with the proper recording equalization as determined by your recorder, while simultaneously monitoring the program with the proper tone control, contour and loudness setting.

Connecting Auxiliary Monaural Equipment:

A TV tuner or other similar device with high output levels may be connected to either the LEFT or RIGHT TAPE-HI/AUX jack on the rear panel.

OPERATING THE MODEL A-224 AS A MONAURAL AMPLIFIER

The Model A-224 incorporates the following front panel controls. Viewing the instrument from left to right you will note a TREBLE Control (on/off switch is incorporated in this control), BASS Control, LOUDNESS Control, BALANCE Control, MODE Switch and FUNCTION Switch. On the upper left section of the front panel you will note two SPEAKER SELECTOR Switches and on the upper right section a CONTOUR Switch and RUMBLE FILTER Switch.

TECHNICAL EXPLANATION OF THE CONTROLS

Bass and Treble:

These controls provide the full range of tonal adjustment necessary for high fidelity listening. These controls can either boost or cut the bass and treble tones of your monaural system. The controls should be set in accordance with your hearing preference, speaker characteristics and room acoustics.

Loudness Control:

This control adjusts the volume level of any program material fed into your high fidelity system. Its effect can be modified by the CONTOUR Switch.

OPERATING THE MODEL A-224 AS A STEREOPHONIC AMPLIFIER

Every control on a well designed and honestly considered high fidelity instrument has a specific useful function, related to each of the other controls. A brief explanatory note on the relationship of the various front panel controls will doubtless prove useful in organizing and clarifying them for you.

The Model A-224 incorporates the following front panel controls. Viewing the instrument from left to right you will note a TREBLE control (on/off switch is incorporated in this control), BASS control, LOUDNESS control, BALANCE control, MODE switch and FUNCTION switch. On the upper left section of the front panel you will note two SPEAKER SELECTOR switches and on the upper right section a CONTOUR switch and RUMBLE FILTER switch.

TECHNICAL EXPLANATION OF THE CONTROLS

Since a stereo amplifier is actually two amplifiers in one, the number of operating controls would normally be doubled. This would make operation unnecessarily cumbersome. For convenience the duplicate controls are mechanically tied together, or ganged, to be operated by one knob.

Bass and Treble:

The BASS and TREBLE controls on the Model A-224 provide the full range of tonal adjustment necessary for high fidelity listening. These controls can either boost or cut the bass and treble tones of the stereo system. The controls should be set in accordance with your hearing preference, speaker characteristics and room acoustics.

Loudness Control:

This control adjusts the volume level of any program material fed into your stereo system. Its effect can be modified by the CONTOUR switch.

Contour Switch:

One of the limitations of human hearing is its tendency to lose sensitivity to the very low pitched sounds, as the program sound level is reduced. It is this characteristic (known as the Fletcher-Munson effect) which causes one to play music programs at high listening level in order to experience the full rich tone available from fine modern recordings. The Harman-Kardon CONTOUR switch compensates for the Fletcher-Munson effect thus eliminating high listening levels as a requisite for full enjoyment of reproduced music.

For low level listening throw the CONTOUR switch located on the front panel to the "ON" position. You will note how the low frequencies become more apparent while the volume level remains unchanged.

Balance Control:

The nature of stereo reproduction is such that it requires two identical channels to attain the highest degree of faithfulness and spatial distribution. Any variation in the efficiency of one channel as compared to the other will disturb this relationship. Since there may be slight differences between the two speakers, tape heads, etc., the A-224 includes a control to balance one channel against the other. Sufficient range is covered by this control to permit rebalancing of the overall system even in cases where major unbalance exists. It is entirely to be expected that this control will be set anywhere within its range to attain system balance.

When the BALANCE control is properly set, the apparent sound source will lie in a broad area between the two speakers. When the BALANCE control is rotated to the right the sound will move to the right and when the control is rotated to the left, the sound will move to the left.

Mode Switch:

The MODE switch selects between stereo operation, where a stereo program source is available, and monaural operation utilizing the full power of both channels and both speakers when the program source is monaural only.

USING THE MODEL A-224 AS A CONVERSION AMPLIFIER FOR STEREO

If you now own a basic amplifier, or an amplifier-preamplifier, you may utilize the model A-224 for the second channel and control the entire stereo system with the A-224 preamplifier. For this application the model A-224 is connected in the manner described below.

INSTALLATION PROCEDURE

Connecting Your Speakers:

Your two speakers should be matched if possible to obtain optimum results and should be placed 8 to 15 feet apart against one wall of your listening room. Corner placement is also quite acceptable. Facing the speakers straight out or slanting them slightly, will depend on your room size, acoustic effect and where you will be seated for listening. It may be necessary to experiment with speaker placement until best results are obtained.

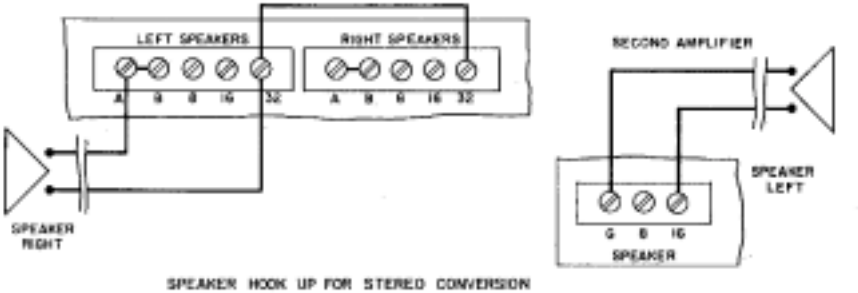
Use any type wire to connect your speakers. Lamp cord is excellent and may be easily dressed around the molding for an inconspicuous and neat installation.

Speaker Connection For Conversion Arrangement:

Set the POWER PARALLEL Switch located on the front chassis support apron to the left of the pilot light to the "PARALLEL" position and strap the appropriate Speaker Output terminals together. IMPORTANT: Whenever the POWER PARALLEL Switch is in the "PARALLEL" position, the Speaker Output terminals must be strapped together, and conversely whenever the Speaker Output terminals are strapped together, the POWER PARALLEL Switch must be in the "PARALLEL" position.

Connect Speaker A (refer to Diagram E) to either 32 ohm terminal on the Speaker Output strip and the other lead to either A terminal. Now tie the two 32 ohm terminals together. The A and B terminals on both output strips have been strapped together at the factory, and should be left that way. If you are using an 8 ohm speaker, tie the two 16 ohm terminals together instead of the 32 ohm terminals as described. The SPEAKER SELECTOR Switch on the front panel may be placed in any position since it is inoperative for this method of installation.

Connect Speaker B to the "G" and 16 ohm speaker terminals on your other monaural amplifier.



SPEAKER HOOK UP FOR STEREO CONVERSION

Diagram E

Connecting Both Amplifiers For Stereo Operation:

Connect a shielded lead not longer than 3 or 4 feet between the LEFT PREAMP OUT jack on the rear of the A-224 and the Aux or Tuner input on your other amplifier.

Connect the AC power cord from your monaural amplifier to the AC convenience outlet on the rear of the Model A-224. The on/off switch on the A-224 will now control the power for both amplifiers.

Contour Switch:

One of the limitations of human hearing is its tendency to lose sensitivity to the very low pitched sounds, as the program sound level is reduced. It is this characteristic (known as the Fletcher-Munson effect) which causes one to play music programs at high listening level in order to experience the full rich tone available from fine modern recordings. The Harman-Kardon CONTOUR Switch compensates for the Fletcher-Munson effect, thus eliminating high listening levels as a requisite for full enjoyment of reproduced music.

For low level listening throw the CONTOUR Switch located on the front panel to the "ON" position. You will note how the low frequencies become more apparent while the volume level remains unchanged.

Balance Control:

This control has no function in monaural listening and should be left in the center position. If rotated to either extreme position, it would completely shut off the preamplifier on that side.

Mode Switch:

The only application for this switch in monaural operation is to select between the two preamplifiers. This allows for double the usual number of input jacks found on ordinary monaural amplifiers. The STEREO NORMAL and MONAURAL RIGHT positions are identically connected and will activate the Right preamplifier, therefore switching on all program material connected to this preamplifier. STEREO REVERSE and MONAURAL LEFT are identically connected and will activate the Left preamplifier.

For simplicity, it is suggested to use only the MONAURAL RIGHT and MONAURAL LEFT positions on the MODE Switch for monaural operation. Switch to MONAURAL RIGHT or MONAURAL LEFT as a function of the preamplifier you wish to use.

Function Switch:

The FUNCTION Switch selects the desired type of program source and has four positions. TAPE-LO/PHONO-LO selects the program source plugged into the LOW LEVEL INPUTS which may be either tape or magnetic phono. The next position, PHONO-HI, selects either of the two PHONO-HI inputs. The TUNER position selects your monaural tuner for operation and the AUX/TAPE-HI selects your tape recorder or other auxiliary monaural equipment.

Speaker Selector Switch:

In a monaural installation where more than one set of speakers are installed (for example: one speaker in the living room and another in the den) selection between the two speakers is made by operating the SPEAKER SELECTOR switch on the front panel.

To operate Speaker A (located in your living room) set the Left SPEAKER SELECTOR Switch located on the front panel to "A", and the other SPEAKER SELECTOR Switch to "ONE". To select Speaker B (located in another room), set the SPEAKER SELECTOR Switch to "B" and the right SPEAKER SELECTOR Switch to "ONE". To operate both speakers simultaneously, set the Left SPEAKER SELECTOR Switch to either "A" or "B" and set the right SPEAKER SELECTOR Switch to "ALL".

Rumble Filter:

At times, record changers, records and even some turntables produce an objectional low frequency signal that is strong enough to be introduced into the sensitive playback system. Known as "Rumble", this undesirable signal can be eliminated by the special RUMBLE FILTER Switch incorporated in the Model A-224. Whenever rumble is encountered, set the switch to "ON".